



Docket No. 8733.120.01

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re application of

Woo Sup SHIN, et al.

Group Art Unit: 1763

Serial No.: 09/039,438

Examiner: A. Powell

Filed: March 16, 1998

For: **Etching Apparatus**

REQUEST FOR RECONSIDERATION

Assistant Commissioner of Patents
Washington, D.C. 20231

Sir:

In response to the Final Office Action dated January 30, 2001, Applicants respectfully submit the following remarks:

REMARKS

In the Final Office Action dated January 30, 2001, the Examiner rejected claims 1 and 19-20 as being unpatentable over Nelson in view of Chung, rejected claims 2, 7 and 10 as being unpatentable over Nelson in view of Chung and Tittle, rejected claims 3-6, 8-9 and 11-18 as being unpatentable over Nelson in view of Chung, Jones and Tittle.

Applicants respectfully assert that the Office Action still fails to provide a motivation to combine the cited references to establish *prima facie* obviousness. Moreover, as discussed in detail below, Applicants believe that the references fail to teach or suggest the claimed combination and a reasonable expectation of success as are required to establish *prima facie* obviousness. MPEP 2142.

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion of motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine the reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim

limitations. The teaching or suggestion to make the claimed combination must both be found in the prior art, and not based on the applicant's disclosure. MPEP 2142 and MPEP 2143.

Applicants respectfully assert that (1) the prior art references, singly or in combination, do not teach or suggest all of the claim limitations of at least independent claims 1, 10 and 11; (2) although the Office Action states a motivation to combine references, the stated motivation is improper; and (3) there is no reasonable expectation of success addressed in the Office Action.

Claim Limitations Not Taught or Suggested by References

To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. MPEP 2143.03, citing *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). Moreover, all of the words in the claim must be considered when reviewing the claim in light of the prior art. *Id.*

Claim 1

Claim 1 and its dependent claims 2-9 and 19, each recite *inter alia* the following elements:

an etch bath having a bubble plate, and
a glass substrate etched to reduce a thickness of the glass substrate.

As Applicants noted in the Amendment filed July 6, 2000, Nelson fails to show an etch bath having a bubble plate.

Moreover, Nelson specifically discloses that “[t]he invention relates to chemical etching of material, often from a substrate . . .” Nelson, col. 1, lines 9 - 11 (emphasis added). It is clear from Nelson that the invention described therein is for removing materials that have been applied to the substrate, not for thinning the substrate by etching. Nowhere does Nelson

disclose or even imply the etching of a substrate itself, and as such, it cannot be said to teach or suggest an apparatus that reduces a thickness of a substrate by etching. Nelson does not teach or suggest etching of any material--substrate or other--by immersing the material in an etch bath. Moreover, Nelson does not teach or suggest the etching of glass.

In addition, the Examiner states that the rinse chamber 4 of Nelson reads on the claimed second tank. Claim 1 recites “a second tank for receiving the residual etchant from the etch bath and for separating the diluted etchant from the residue material.” The rinse chamber 4 of Nelson is for rinsing the etched solids with water or an aqueous solution in order to wash off and remove entrained etchant solution which is initially present as a coating on the etched solids. Col. 4, lines 50-55. The rinse chamber and the claimed second tank do not serve the same purpose, and therefore the rinse chamber cannot read on the second tank, as suggested in the Office Action.

Furthermore, the Examiner states that the combined stream 31 of Nelson reads on the connecting passage, as recited by the claim. However, the combined stream 31 of Nelson cannot read on the claimed connecting passage. Claim 1 recites “a connecting passage connecting the first and second tanks for transferring the separated diluted etchant from the second tank to the first tank.” The Examiner asserts that the etcher of Nelson reads on the claimed first tank and that the rinse chamber of Nelson reads on the claimed second tank. However, the combined stream 31 of Nelson does not connect the etcher and the rinse chamber; the combined stream 31 of Nelson connects the bulk storage tank to the etcher. Thus, the combined stream 31 of Nelson cannot read on the claimed connecting passage.

Accordingly, with regard to claim 1, Nelson fails to teach or suggest at least an etch bath having a bubble plate, (etching of) a glass substrate, a second tank, and a connecting passage, all of which are recited by claim 1.

The Examiner cites Chung as disclosing the elements not taught by Nelson. However, Chung fails to cure the deficiencies of Nelson in that Chung fails to teach or suggest at least (etching of) a glass substrate, a second tank, and a connecting passage.

Therefore, Applicants assert that the combination of references fails to teach or suggest all of the claim elements, as is required to support *prima facie* obviousness.

Claim 10

Claim 10 and its dependent claim 20 each recite *inter alia* the following elements:

an etch bath adapted to receive the substrate immersed in the etchant for etching the glass substrate to uniformly reduce a thickness of the glass substrate;
a temperature sensor installed in the etch bath for monitoring a temperature of the etchant while the glass substrate is etched in the etch bath; and
a control unit for receiving a signal indicating the temperature of the etchant from the temperature sensor and transmitting an etching termination signal to the etch bath when the temperature reaches a target temperature.

In the Office Action, the Examiner rejects claim 10 by citing the rejection of claim 1 over Nelson and Chung, in further view of Tittle.

As discussed above with regard to claim 1, Nelson fails to teach or suggest etching of any material – substrate or other – by immersing the material in an etch bath. Nelson does not teach or suggest the etching of glass. Chung fails to cure the deficiencies of Nelson in that Chung fails to teach or suggest at least a glass substrate, temperature sensor and control unit. Furthermore, Nelson and Chung, even if combined, fail to teach or suggest at least a temperature sensor and a control unit as recited in claim 10.

The Examiner cites Tittle as disclosing the elements lacking in Nelson and Chung. Specifically, the Office Action states “Tittle et al disclose a process control system having a plurality of sensors for sensing various parameters. One of the parameters for controlling the

process may include temperature. A formula may be used to compute bath effectiveness based on the parameters detected. Any variation of the effectiveness triggers a responsive change. A response change can be the termination of the etch process.” Office Action, Paper No. 23, at P. 4 (citations omitted).

Applicants respectfully disagree. Tittle fails to teach or suggest at least etching a glass substrate and a control unit for receiving a signal indicating the temperature of the etchant from the temperature sensor and transmitting an etching termination signal to the etch bath when the temperature sensor reaches a target temperature.

Therefore, Applicants assert that the combination of references including Nelson, Chung and Tittle fails to teach or suggest all of the claim elements, as is required to support *prima facie* obviousness.

Claim 11

Claim 11 and its dependent claims 12-18 each recite *inter alia* the following elements:

a first tank including a first etchant;
an etch bath having a bubble plate, the etch bath being connected to the first tank connected to the first tank for receiving the first etchant and adapted to etch the glass substrate;
a separation tank adapted to receive the residual etchant;
a rinse bath for cleaning the glass substrate;
a dry bath for drying the glass substrate;
a solvent supply source;
an etching solution source; and
a control unit for controlling the etch bath, the rinse bath, the dry bath, the first tank and the separation tank.

In the Office Action, the Examiner rejects claim 11 by citing the rejection of claim 1 over Nelson and Chung, in further view of Jones and Tittle.

As discussed above with regard to claim 1, Nelson fails to teach or suggest etching of any material – substrate or other – by immersing the material in an etch bath. Nelson does not teach or suggest the etching of glass. Chung fails to cure the deficiencies of Nelson. Moreover, Nelson and Chung fail to teach or suggest at least the first tank, the etch bath, the separation tank, the rinse bath, the dry bath, the etchant supply source, the solvent supply source, and the control unit, as recited in claim 11.

The Examiner cites Jones as disclosing the elements lacking in Nelson and Chung. Specifically, the Office Action states “Jones et al disclose a chemical processing apparatus containing a plurality of treatment chambers having a dip chamber with filling pumps, a spray chamber which serves as a rinse chamber or drying chamber. The rinse chamber would be filled with deionized water from a deionized reservoir. An essential part of the apparatus is a conveyor means for automatically transferring the workpieces from treatment chamber to treatment chamber. The conveyor allows for a plurality of substrates to be processed substantially at the same time. Using a pump to move fluid from one chamber to another is conventional.” Office Action, Paper No. 23, at P. 5 (citations omitted). The Examiner further cites Title as disclosing “a temperature sensor or a concentration measuring.” Id.

However, Title and Jones fail to cure the deficiencies of Nelson and Chung. *Inter alia*, Title and Jones fail to teach or suggest at least etching of a glass substrate, the first tank, the separation tank, and the etchant supply source.

Therefore, Applicants assert that the combination of references fails to teach or suggest all of the claim elements, as is required for *prima facie* obviousness.

No Motivation to Combine References

The Manual of Patent Examining Procedure (“MPEP”), citing In re Mills, 916 F.2d

680, 16 USPQ2d 1430 (Fed. Cir. 1990) states:

The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination.
MPEP 2143.

Moreover, although a device may be capable or being modified, there must be some suggestion or motivation in the references. MPEP 2143. Furthermore, if the suggested combination of references requires a substantial restructuring or redesign of the primary reference and a change in the basic principle of operation of the primary reference, then there can be no motivation to combine. MPEP 2143, citing In re Ratti, 270 F.2d 810, 123 USPQ 349 (CCPA 1959). It must first be shown that there is some suggestion or motivation to combine the references cited, either in the references themselves, or in the knowledge generally available to one of ordinary skill in the art to modify the reference or to combine the references teachings. MPEP 2143.

The Office Action dated January 30, 2001 states at page 3

“At the time of the invention it would have been obvious to a person of ordinary skill in the art to replace the spray etcher of Nelson with the etch bath and bubble plate of Chung et al.

The motivation for doing so would have been to etch substrates by spraying etchant onto substrates to immerse the substrates in said etchant within a tank while agitating the etchant with inert gas transmitted through a bubble plate in order to promote reaction and remove the substrate surfaces reacted impurities as taught by Chung et al.” Office Action, Paper No. 23 at P. 3.

However, Applicants respectfully submit that this recitation of motivation fails to explain what specific scientific understanding or technological principle within the knowledge of one of ordinary skill in the art would have suggested the combination of Nelson and Chung. Moreover, simply because it might be possible to somehow modify Nelson to

include a cleaning tank and an integrated pipe as taught by Chung is insufficient to combine the references. Nothing in either reference suggests modifying the ion-etching apparatus of Nelson in view of the wafer cleaning apparatus of Chung.

The Office Action suggests that the motivation “would have been to etch substrates by spraying etchant onto substrates to immerse the substrates in said etchant within a tank while agitating the etchant with inert gas transmitted through a bubble plate in order to promote reaction and remove the substrate surfaces reacted impurities as taught by Chung et al.” Office Action, Paper No. 23 at P. 3. However, this “motivation” is merely a statement of the operation disclosed in the present application phrased in the language of each of the cited references. This is an impermissible hindsight interpretation of the prior art that cannot suffice as motivation to support *prima facie* obviousness. *See, In re Kotzab*, 217 F.3d 1365, 1369 (Fed. Cir. 2000). Moreover, the “motivation” suggested by the Office Action implies that it would be obvious to try to apply the teachings of Chung to the teaching of Nelson. Such an “obvious to try” argument is also impermissible. Whether a particular combination might be “obvious to try” is not a legitimate test of patentability. *In re Fine*, 837 F.2d 1071, 1075 (Fed. Cir. 1988). Furthermore, identification of each individual claimed part in the prior art is insufficient to defeat patentability of the whole claimed invention without some motivation, suggestion, or teaching of the desirability of making the specific combination that was made by the applicant. *In re Kotzab*, 217 F.3d at 1370.

Therefore, Applicants respectfully request reconsideration of the claims rejected over the combination of Nelson and Chung.

In addition, and for similar reasons, Applicants respectfully traverse the rejection of claims 2, 7, and 10 under 35 U.S.C. § 103(a) as being unpatentable over Nelson in view of Chung in further view of Title. As discussed above, Nelson neither teaches nor suggests the

following elements of the present invention as recited in independent claims 1 and 10:

an etch bath having a bubble plate, and
etching a glass substrate to reduce a thickness of the glass substrate.

The Office Action cites Chung and Tittle as teaching the elements lacking in Nelson.

As discussed above, Applicants respectfully submit that there is no motivation or suggestion in the references to suggest to one of ordinary skill in the art to combine Nelson and Chung. Moreover, nothing in Tittle, which simply disclose a chemical bath process control system, provides such motivation.

In addition, Applicants assert that, because there is no motivation or suggestion to combine Nelson and Chung, there is no motivation or suggestion to consider Tittle in a manner that would render the claims obvious in view of Nelson, Chung and Tittle. Moreover, nothing in either reference suggests the desirability of so modifying the ion-etching apparatus of Nelson in view of the wafer cleaning apparatus of Chung.

The Office Action suggests that the motivation for combining these references "would have been to monitor, initiate corrective action and establish limits for etching operation as taught by Tittle et al." Office Action, Paper No. 23 at P. 4. Again, this "motivation" is merely a statement of the operation disclosed in the present application phrased in the language of each of the cited references. This is an impermissible hindsight interpretation of the prior art that cannot suffice as motivation to support *prima facie* obviousness. Moreover, the "motivation" suggested by the Office Action implies that it would be obvious to try to apply the teachings of Tittle to the teachings of Chung and Nelson. Such an "obvious to try" argument is also impermissible. Whether a particular combination might be "obvious to try" is not a legitimate test of patentability. In re Fine, 837 F.2d 1071, 1075 (Fed. Cir. 1988). Furthermore, identification of each individual claimed part in the prior art is insufficient to

defeat patentability of the whole claimed invention without some motivation, suggestion, or teaching of the desirability of making the specific combination that was made by the applicant. In re Kotzab, 217 F.3d at 1370.

Therefore, Applicants respectfully request reconsideration of the claims rejected over the combination of Nelson, Chung and Tittle.

Finally, claims 3 - 6, 8 - 9, and 11 - 18 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Nelson in view of Jones, and Tittle. Applicants respectfully traverse the rejection. Claims 3 - 6, 8 - 9, and 11 - 18 are allowable over the cited references in that these claims recite, in varying degrees of specificity, a combination of features including an etching apparatus for etching a glass substrate comprising an etch bath having a bubble plate.

The Office Action cites Chung, Tittle, and Jones as teaching the elements lacking in Nelson. As discussed above, Applicants respectfully submit that there is no motivation or suggestion in the references to suggest to one of ordinary skill in the art to combine Nelson and Chung, or to consider Tittle in view of Nelson or Chung. Moreover, nothing in Jones, provides such motivation.

In addition, Applicants assert that, because there is no motivation or suggestion to combine Nelson, Chung, and Tittle, there is no motivation or suggestion to consider Jones in a manner that would render the claims obvious in view of Nelson, Chung, Tittle, and Jones. Moreover, nothing in the references suggests the desirability of so modifying the ion-etching apparatus of Nelson in view of the wafer cleaning apparatus of Chung, the chemical process control system of Tittle, or apparatus for chemical processing of workpieces of Jones.

The Office Action suggests that the motivation for combining these references “would have been to provide treating operations such as rinsing and drying as taught by Jones et al.” Office Action, Paper No. 23 at P. 5. However, this “motivation” is merely a statement of the

operation disclosed in the present application phrased in the language of each of the cited references. This is an impermissible hindsight interpretation of the prior art that cannot suffice as motivation to support *prima facie* obviousness. Moreover, the "motivation" suggested by the Office Action implies that it would be obvious to try to apply the teachings of Title to the teachings of Chung and Nelson. Such an "obvious to try" argument is also impermissible. Whether a particular combination might be "obvious to try" is not a legitimate test of patentability. In re Fine, 837 F.2d 1071, 1075 (Fed. Cir. 1988). Furthermore, identification of each individual claimed part in the prior art is insufficient to defeat patentability of the whole claimed invention without some motivation, suggestion, or teaching of the desirability of making the specific combination that was made by the applicant. In re Kotzab, 217 F.3d at 1370.

Therefore, Applicants respectfully request reconsideration of the claims rejected over the combination of Nelson, Chung, Title, and Jones.

No Reasonable Expectation of Success

Absent a reasonable expectation of success, the prior art cannot be combined to reject claims as *prima facie* obvious. See, MPEP 2143.02 (citing In re Merck & Co., Inc., 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). Applicants submit that there is no reasonable expectation of success set forth in the Office Action to establish *prima facie* obviousness of the claimed device.

Applicants respectfully submit that there is nothing in Chung or Nelson that suggests any reasonable expectation of success if the teachings of Chung were to be combined with the teachings of Nelson. As applicants have previously noted in the Request for Reconsideration filed November 29, 2000, Nelson and Chung do not teach the thinning of glass substrate.

Nelson teaches removing materials that have been applied to a substrate, not for thinning the substrate by etching. Nowhere does Nelson disclose or even imply the etching of a substrate itself. Nelson does not teach or suggest etching of any material--substrate or other--by immersing the material in an etch bath.

Chung specifically discloses that “[t]his invention relates to semiconductor cleaning and, more particularly, to semiconductor cleaning through agitation of a reagent chemical in an acid solution.” It is clear from Chung that the invention described therein is for cleaning a semiconductor wafer, *i.e.*, “the removal of impurities from the surfaces of [semiconductor] wafers.” Col. 2, lines 1-2.

Applicants respectfully submit that one of ordinary skill in the art would not have a reasonable expectation of success to achieve the benefits of the claimed invention by combining the non-immersion etching techniques of Nelson and the cleaning techniques of Chung. Specifically, Applicants submit that non-immersion etching of a non-glass substrate combined with cleaning of a non-glass substrate would not lead one of ordinary skill in the art to reasonably expect success from the claimed device for thinning a glass substrate.

Therefore, Applicants submit that there is no reasonable expectation of success set forth in the Office Action to establish *prima facie* obviousness of the claimed device. Moreover, because there is no reasonable expectation of success in the combination of Nelson and Chung, it follows that the addition of Title and Jones cannot cure the lack of such an expectation. Therefore, Applicants submit that the discussion of Nelson and Chung applies to all the rejections of the claims set forth in the Office Action.

In view of the foregoing Remarks, Applicants respectfully submit that the application is in condition for allowance and early, favorable action is respectfully solicited.

If for any reason the Examiner finds the application other than in condition for

allowance, the Examiner is requested to call the undersigned attorney at (202) 624-1200 to discuss the steps necessary for placing the application in condition for allowance. All correspondence should continue to be sent to the below-listed address.

If these papers are not considered timely filed by the Patent and Trademark Office, then a petition is hereby made under 37 C.F.R. §1.136, and any additional fees required under 37 C.F.R. §1.136 for any necessary extension of time, or any other fees required to complete the filing of this response, may be charged to Deposit Account No. 50-0911. Please credit any overpayment to deposit Account No. 50-0911. A duplicate copy of this sheet is enclosed.

Respectfully submitted,

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